

Storage and Related Peripherals

This section presents the PC 99 requirements for storage and related peripherals, including DVD devices. Specific requirements for SCSI, IDE, and ATAPI peripherals are defined in the related chapters in Part 3 of this guide.

For specific information about implementation details related to storage devices under the Windows and Windows NT operating systems, see the articles at <http://www.microsoft.com/hwdev/devdes/>.

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Storage Controller and Peripherals Basic Features

This section summarizes the hardware requirements for storage peripherals. For related acoustical requirements for storage devices, see the “PC 99 Basic Requirements” chapter in Part 2 of this guide.

1. Storage device and controller support bus master capabilities

Required

Bus master capabilities must meet the related specification for the particular controller. For example, the programming register set for PCI IDE bus master DMA is defined in SFF 8038i.

Correctly implemented bus master support ensures improved performance and Windows-compatible device driver support.

Note: This requirement does not apply to legacy FDCs and will not become a requirement for legacy FDCs.

2. Removable media includes media status notification support

Required

The following list shows the required specifications for implementing media status notification, depending in device type.

| Device type | Media status notification implementation |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CD and DVD devices | Required. Comply with all provisions (<u>except unit attention condition shall not be cleared by Get Event/Status Notification</u>) in the Media Event Status Notification subsection of SFF 8090 (Mt. Fuji specification), available at ftp://fission.dt.wdc.com/pub/standards/SFF/specs/ . <u>See related specific requirements in the “DVD device meets SFF 8090 specification” requirement later in this chapter.</u> |
| Non-ATAPI IDE storage devices | Required. Comply with <i>Media Status Notification Support, Version 1.03</i> or later, available at http://www.microsoft.com/hwdev/specs/ . |
| ATAPI floppy/optical direct access drives | Required. Comply with media status notification as defined in SFF 8070. |
| All ATAPI IDE devices, including tape drives | Recommended. Comply with SFF 8090 (Mt. Fuji specification) if implemented. |
| Other types of SCSI removable devices | Recommended. Comply with SFF 8090 (Mt. Fuji specification) if implemented. |

3. Device meets PC 99 general device requirements

Required

These include the PC 99 requirements for a Plug and Play device ID, automated software-only settings for device configuration, device drivers and Windows-

based installation, and icons for external connectors. For more information, see the “PC 99 Basic Requirements” chapter in Part 2 of this guide.

4. Device meets PC 99 requirements for ports or buses

Required

The device must meet all requirements for the port or bus to which it is attached. For example, a drive that uses the parallel port must meet all the requirements defined for legacy Plug and Play parallel peripherals (including requirements for ECP mode), as defined in the “I/O Ports and Devices” chapter in Part 4 of this guide. If the device uses a PCI, ATA, or SCSI connection, the device must meet the related requirements defined in Part 3 of this guide.

5. Device Bay storage device meets PC 99 requirements

Required

Device Bay is not required for PC 99 systems. All Device Bay devices included with a PC 99 system or provided as retail devices must meet the requirements defined in *Device Bay Interface Specification, Version 1.0*. Any storage device designed as a Device Bay peripheral must also interface with either the USB or IEEE 1394 bus, or both, and must support the *Universal Serial Bus Device Class Definition for Mass Storage Devices, Version 1.0* or later, if it interfaces with USB.

6. Secondary host controller uses IEEE 1394

Recommended

IEEE 1394 is recommended as the secondary host controller for storage with the intent of requiring IEEE 1394 as the primary host controller in future design guides.

7. ATA devices and controllers support Ultra DMA/33

Required

All ATA devices and controllers must support Ultra DMA/33 (also known as Ultra-ATA) at transfer rates up to 33 MB per second as defined in ATA/ATAPI-4 Revision 17 and as outlined in the “ATA and ATAPI” chapter of this guide. A peripheral that does not support the Ultra DMA transfer protocol must, at least, implement the termination scheme required by this protocol in order to be tolerant of Ultra DMA as outlined in the “ATA and ATAPI” chapter in Part 3 of this guide.

8. USB-based mass storage device meets PC 99 requirements for USB

Required

If a USB-based mass-storage device (including tape and CD-ROM) is implemented in a PC 99 system, it must meet the requirements defined in the “USB” chapter in Part 3 of this guide. It must also meet the requirements defined in *Universal Serial Bus Device Class Definition for Mass Storage Devices, Version 1.0* or later.

9. System BIOS or option ROM supports El Torito No Emulation mode*Required*

For PC systems that include CD-ROM or DVD-ROM devices, the system BIOS or option ROM must support the No Emulation mode defined in the specification *El Torito—Bootable CD-ROM Format Specification, Version 1.0*, published by IBM and Phoenix.

Floppy Disk Controller

This section describes the specific requirements for any FDC provided with a PC 99 system. The device must also meet the general requirements defined in the “Storage Peripherals Basic Features” section earlier in this chapter and the “PC 99 Design for Storage Components” section later in this chapter.

PC 99 does not require an FDC. Although most systems include some form of floppy disk drive, some Office PC 99 systems might not need one.

10. IDE floppy drive complies with SFF 8070*RequiredRecommended*

Although the use of an IDE floppy drive is optional, if included, it ~~must~~ should comply with the MMC-2 standard~~SFF 8070 specification~~, which defines the required implementation supported by the Windows operating system, including support for ATA floptical drives.

11. Legacy FDC built into system*Optional*

Including a legacy FDC on a PC 99 system is optional.

12. Legacy FDC device meets resource configuration requirements, if present*Required*

The following resource requirements must be met for each legacy FDC device on the system (not shared among devices of the same type):

- Use static I/O addresses 3F2h, 3F4h, and 3F5h. Additional addresses can be provided in the event of conflict.
- Use IRQ 6.
- Use DMA Channel 2 if FDC supports block data transfers to memory using DMA controllers.

13. System supports conflict resolution and dynamic disable capabilities for legacy FDC*Required*

The FDC must be capable of being disabled. For example, if the FDC is located on the system board and an adapter card that includes an FDC is added to the system, the system-board FDC must be capable of being disabled to prevent

conflicts with the new card. If the FDC is located on an expansion card, the expansion card must allow independent dynamic disabling of the FDC and the hard disk controller. In this case, the adapter will continue to function if the FDC is disabled because of conflicts, and vice versa.

Hard Disk Drives

This section summarizes specific requirements for hard disk drives. The device must also meet the general requirements defined in the “Storage Peripherals Basic Features” and “PC 99 Design for Storage Components” sections in this chapter.

Note: In the “ATA and ATAPI” chapter in Part 3 of this guide, BIOS support is required for Logical Block Addressing (that is, the LBA bit in the Device/Head register shall be set to one) for all read and write operations to ATA disk drives that have capacities greater than 528 MB (1,030,176 logical blocks).

14. ATA hard drive is SMART-compliant and uses SMART IOCTL API *Recommended*

The Self-Monitoring, Analysis, and Reporting Technology system (SMART) is an industry term used to describe technology that monitors and predicts device performance.

The *SMART IOCTL API Specification, Version 1.1* or later, published by Compaq Computer Corporation and Microsoft Corporation, describes the API used by an application to issue SMART commands to an IDE drive under Microsoft Windows 98. In Windows, the API is implemented in a vendor-specific driver: Smartvxd.vxd.

The hard drive should be SMART-compliant. If SMART compliance is implemented, the driver must support the SMART IOCTLs.

CD Devices

This section summarizes the requirements for CD-ROM peripherals and the specific features for PC 99. The device must also meet the general requirements defined in the “Storage Peripherals Basic Features” and “PC 99 Design for Storage Components” sections in this chapter, including the requirement for bus mastering.

15. CD device provides 8x minimum transfer rate or better performance anywhere on the disc

Required

The minimum CD device media transfer rate must be no less than 1200 KB per second when running in the fully on power state.

16. CD drive is CD-Enhanced compatible*Required*

For PC 99, the CD-ROM drive must be able to mount multisession CD-ROM discs, even if track 1 is Red Book audio. Microsoft recommends use of the Sony ReadTOC method for SCSI-2 multisession support as noted in MMC-2, SFF 8020i, Version 2.5.

CD-Enhanced support must be Blue Book compliant, as defined in *Enhanced Music CD Specification, Version 1.0*.

17. CD-ROM drive supports specified logical and physical CD formats*Required*

At a minimum, the CD device must be compatible with the following formats to ensure cross-media compatibility:

- Logical formats: CD Red Book (CD-Audio), Yellow Book (CD-ROM), Orange Book parts II and III (packet writing if recordable), White Book, and Blue Book
- Physical formats: ROM (stamped) and Orange Book part II (CD-R) and part III (CD-RW).
- Conforming to OSTA's MultiRead Version 1.11 indicates compliance to all of the above requirements.

Note: Any ATAPI CD drive designed to play back CD-I content must return a minimum of two track entries for the READ_TOC (0x43) command. These two track entries must be a track 01 entry and a track 0xAA entry for the lead-out address. Drives that do not comply with this minimum requirement cannot play back CD-I movies.

18. ATA/ATAPI CD drive complies with SFF 8020i, Version 1.22.6*Required*

CD drives attached to the system using the IDE interface must support the hardware and protocols documented in *ATA Packet Interface for CD-ROMs, Version 1.22.6* or later.

Note: For PC 99, support for the READ CD-DA command as defined in SFF 8020i, Version 1.22.6, is recommended. This might become a requirement in future versions of these guidelines.

For DVD drives, see the "DVD device meets SFF 8090 specification" requirement later in this chapter.

19. CD drive supports multisession and compatibility forms of the READ_TOC command

Required

Both multisession forms (01b and 10b) as well as the compatibility form (00b) of the READ_TOC command must be implemented. This ensures complete support for CD-ROM multisession capabilities.

Note: Any ATAPI CD drive designed to play back CD-I content must return a minimum of two track entries for the READ_TOC (0x43) command. These two track entries must be a track 01 entry and a track 0xAA entry for the lead-out address. Drives that do not comply with this minimum requirement cannot play back CD-I movies.

20. ATA/ATAPI CD changer meets MMC-2 standard~~SFF 8070 specification~~

Required

If an ATAPI-compatible CD changer is present that has a capacity for seven or fewer discs, the device must comply with MMC-2~~SFF 8070~~.

21. CD device uses push-to-close design

Recommended

A motorized design is not required, but if it is implemented, the device must be designed so the user has three options for closing the device when inserting a disc:

- Physically pushing on the bay.
- Physically pushing the close button on the bay housing.
- Selecting a software-supported option to close the device.

Rewritable ATAPI Devices

This section summarizes specific requirements for rewritable optical storage devices. The device must also meet the general requirements defined in the “Storage Peripherals Basic Features” and “PC 99 Design for Storage Components” sections in this chapter.

22. Block rewritable ATAPI rewritable device meets SFF 8070i specification~~MMC-2 standard~~

Required

The MMC-2 standard~~SFF 8070i specification~~ defines the requirements for block rewritable ATAPI rewritable devices, including specifications for logical unit number (LUN) implementation, media status notification, and device write protection. This also includes required support for the Read Format Capacities command.

DVD Devices

This section summarizes specific requirements for DVD devices. The device also must meet the general requirements defined in the “Storage Peripherals Basic Features” and “PC 99 Design for Storage Components” sections in this chapter.

For information about the PC 99 requirements for DVD-Video and MPEG-2 playback performance, see the “Video and Broadcast Components” chapter in Part 4 of this guide.

For more information about DVD support under Windows and Windows NT, see the articles at <http://www.microsoft.com/hwdev/devdes/>.

23. DVD device provides 2x minimum transfer rate or better performance anywhere on the disc

Required

The minimum DVD device media transfer rate must be sustained at 18 MB/sec from the DVD disc. A 4X DVD-ROM at 24 MB/sec sustained from the DVD disc is recommended.

24. DVD drive and controller support bus master DMA transfers

Required

The drive and controller must support byte-aligned, multisegment, bus master DMA transfers. DMA must be enabled by default.

If attached by way of an IDE interface, ATAPI DVD drives and IDE system-board implementations must support DMA as specified in **ATA/ATAPI Version 4SFF 8090 (Mt. Fuji specification)**.

The DVD controller must be capable of sustained data transfer rates in excess of 12 MB/s.

25. DVD drive meets minimum compatibility requirements

Required

DVD drives must support all the functionality of CD-ROM drives as outlined in the “CD Devices” section above. Specifically, the DVD device must be compatible with the following formats to ensure that the DVD device can read earlier media:

- Logical formats: CD Red Book (CD-Audio), Yellow Book (CD-ROM), White Book, - Orange Book parts II and III (packet writing), and Blue Book, UDF Version 1.5 and DVD video if applicable.
- Physical formats: ROM (stamped) and Orange Book part 2 (CD-R), ECMA-267 (DVD-ROM). Support for ECMA-274 (DVD+RW) and ECMA-272, 273 (DVD-RAM 1.0) is recommended. ~~CD-ROM, CD-Audio, DVD-ROM, and DVD-RAM 1.0.~~
- Conforming to OSTA’s MultiRead Version 1.5 indicates compliance to all of the above CD compatibility requirements.

The device must also be able to mount multisession CD-ROM discs, as described in the “CD-ROM drive is CD-Enhanced-compatible” requirement earlier in this chapter as well as CD-R_x (also known as CD-RW_x) and CD-E media.

26. DVD device meets SFF 8090 specification MMC-2 standard

Required

SFF 8090 (Mt. Fuji specification) The MMC-2 standard defines the implementation requirements that the Windows operating system supports. For PC 99, a DVD device must comply with the SFF 8090 specification MMC-2 standard. The drive must also support the following commands:

| | | | |
|-----|--------------------------|-----|-----------------------|
| B0h | Read CD | 08h | ATAPI soft reset |
| B9h | Read CD MSF | A0h | ATAPI Packet |
| 4Bh | Pause/resume | A1h | ATAPI identify device |
| E5h | Check power mode | Efh | Set features |
| 90h | Execute drive diagnostic | E6h | Sleep |
| E1h | Idle Immediately | E0h | Standby immediate |
| 00h | NOP | | |

DVD devices must also support the following:

- Timeout model as designed and documented in SFF 8090, Version 1.0 and later.
- The Get Event Status command (Media Event Status class) and all related commands, including Persistent Prevent/Allow, as defined in SFF 8090, Version 1.0 and later.
- Get Configuration command for Morphing class devices (Class 2). Windows 98 uses the Get Configuration command to determine whether media event status is supported correctly.

27. DVD device uses push-to-close design

Recommended

A motorized tray design is not required, but if it is implemented, the device must be designed so the user has three options for closing the device when inserting a disc:

- Physically pushing on the bay.
- Physically pushing the close button on the bay housing.
- Selecting a software-supported option to close the device.

28. DVD device supports defect management*Required*

The drive must support defect management that is transparent to the operating system, according to industry standards. Defect management is defined in *DVD Specification, Book A: Physical Specifications*, published by Toshiba Corporation.

29. DVD device supports copyright protection*Required*

The drive must support a licensed implementation of the CSS copyright-protection scheme and support CSS-protected discs to ensure proper protection for prerecorded video content as defined in the DVD specification.

Software is provided as part of the Windows and Windows NT operating system support for DVD in order to facilitate the authentication process required by this scheme. This allows a DVD-ROM drive to authenticate and transfer keys with a CSS content decrypter. Windows and Windows NT operating system software will act as the agent to allow either hardware or software decrypters to be authenticated.

For information, see the related articles on DVD support under Windows and Windows NT at <http://www.microsoft.com/hwdev/devdes/>.

PC 99 Design for Storage Components

This section summarizes requirements related to Plug and Play and other bus-related and resource-related design issues for storage devices.

Plug and Play and Bus Design for Storage Components

The items in this section are requirements for Plug and Play capabilities.

30. Each device has a Plug and Play device ID*Required*

For each device, there must be a device-specific ID. Each device must provide Plug and Play device IDs in the manner required for the bus it uses as defined in Part 3 of this guide. For example, a PCI add-on device must comply with PCI 2.1 requirements and also must provide a Subsystem ID and Subsystem Vendor ID, as defined in the “PCI” chapter in Part 3 of this guide.

31. Conflict resolution and dynamic disable capabilities supported for all devices*Required*

To ensure conflict resolution for resource allocation, the device must conform to the Plug and Play specifications for the bus it uses as described in Part 3 of this guide. The system must have a method for automatically disabling or relocating the resources used by the device if conflicts occur when an expansion card is added to the system.

Devices must be capable of being disabled with software settings only, that is, without requiring rebooting or jumper setting changes. Disabling the device must result in freeing all its resources for use by other devices. DIP switches on boot devices can be used for an initial power-on default state or for non-Plug and Play system compatibility, but must be able to be overridden by software configuration after system power up.

The primary hard disk controller is not required to support dynamic disable capabilities.

Note: This requirement does not apply to jumper settings used by the OEM to make basic system-related settings in the factory. This requirement applies only to settings that the end user must make to configure the hardware.

32. 3F7h and 377h are unclaimed by devices

Required

To avoid having two devices in the system claim 3F7h and 377h, these addresses must not be claimed for device registers by IDE devices.

It is recognized that some FDC devices claim this range. Such devices can be implemented in a PC 99 system; however, the system manufacturer must ensure that only a single device in the system claims this range.

33. Physical security is provided for storage devices

Recommended

External drive devices should have locking capabilities. This is recommended for PC 99 systems and required for Net PC hardware. Each removable media device should be capable of being locked to prevent unauthorized access to data. This means that the device is rendered useless, either electronically or mechanically.

34. Option ROMs support Int 13h Extensions

Required

The Int 13h Extensions ensure correct support for high-capacity drives, consistent drive-letter mapping between real mode and protected mode, and other capabilities for both Windows and Windows NT. Support for the fixed-disk access subset of Int 13h Extensions must be provided in the system BIOS and in any option ROMs for storage devices that include BIOS support. The Int 13h Extensions are defined in the “Layered Block Device Drivers” section of the Windows 98 DDK and in the Windows NT 5.0 DDK.

Power Management for Storage Components

This section summarizes specific power management requirements for storage devices.

35. Device and controller comply with device class power management reference specification

Required

The *Storage Device Class Power Management Reference Specification, Version 1.0* or later, provides definitions of the OnNow device power states (D0–D3) for these devices. The specification also covers device functionality expected in each power state and possible wake-up event definitions for the class. Power states D0, D1, and D3 are PC 99 requirements for hard disks, CD-ROM drives, and other mass storage devices. Support for the D1 state is not required for floppy disk devices.

Although not required, it is recommended that hard disk drives spin-up and be able to complete a Read operation within 6 seconds of applying power and within 5 seconds of leaving ATA STANDBY mode and transitioning to ATA ACTIVE. This is not expected to become a requirement.

36. Device supports wake-up events

Optional

For PC 99, the ability to cause a wake-up event as defined in the *Storage Device Class Power Management Reference Specification, Version 1.0* or later, is an optional feature.

Device Drivers and Installation for Storage

This section summarizes the basic requirements for device drivers and installation procedures for storage devices.

37. Device drivers and installation meet PC 99 requirements

Required

The manufacturer does not need to supply a driver if a PC 99-compliant driver provided with the operating system can be used. If the manufacturer supplies a driver, the requirements for the device drivers and installation are defined in the “PC 99 Basic Requirements” chapter in Part 2 of this guide. The basic requirements include driver support for unattended installation and Help file support if special driver parameters are used.

Ease-of-use requirements for installation and configuration are defined for SCSI peripherals and for ATA and ATAPI devices in Part 3 of this guide. For information about WDM support for devices that use a USB or IEEE 1394 bus, see the Windows NT 5.0 DDK. See also the related articles on the web site at <http://www.microsoft.com/hwdev/desinit/>.

38. Device driver runs in protected mode following installation*Required*

The device driver must be running in 32-bit protected mode (not compatibility mode) immediately following installation.

Note: Although it is strongly preferred that a system reboot not be required as part of device installation, it is recognized that installation of boot devices presents a special situation. For PC 99, it is acceptable that installation includes restarting the system during installation of a boot device.

39. Applications provided with the device meet Win32 requirements*Required*

Any Windows-based applications provided with the device must meet Microsoft requirements for software compatibility as defined in the Microsoft Platform SDK. However, any software applications included with the device can be installed using an alternate Windows-based installation method as defined in the Microsoft Platform SDK.

40. Device driver for partitioned media supports all Windows and Windows NT partition types*Required*

Device drivers that support partitioned media must support all Windows and Windows NT partition types, which include but are not limited to FAT16, FAT32, and NTFS, plus UDF for DVD-ROM.

41. Device driver for block-mode device supports extended BPBs*Required*

Storage subsystems that include an MS-DOS-based block-mode device driver (for example, Aspidisk.sys) must support Extended BIOS Parameter Blocks (BPBs) in the Build BPB device driver function call, and must support category=48 in the generic IOCTL device driver interface calls, as specified in the 1996 update to the Windows DDK.

Storage References and Resources

This section lists resources for building storage hardware that works with the Windows and Windows NT operating systems.

ATA/ATAPI-4 Revision 17 Working Draft Standard

MMC-2 Multi-Media Command Set-2 revision 5

<ftp://ftp.symbios.com/pub/standards/io/t10/drafts/mmc2/mmc2r05.pdf>

AT Attachment 3 [X3T10 2008D] standard

ATA-2 [X3T9.2 948D], ATA Packet Interface for CD-ROMs, SFF 8020i,
and other SFF Committee publications. Some drafts available at:

<http://fission.dt.wdc.com/pub/standards/SFF/specs/>

Device Bay Interface Specification, Version 1.0

<http://www.device-bay.org>

Device driver support for storage devices and DVD white papers

<http://www.microsoft.com/hwdev/devdes/>

DVD Specification, Book A: Physical Specifications, Toshiba Corporation.

<http://www.toshiba.com>

El Torito—Bootable CD-ROM Format Specification, Version 1.0

<http://www.ptltd.com/techs/specs.html>

FAT32 partition device driver support

<http://www.microsoft.com/hwdev/devdes/>

IDE and SCSI specifications

SFF Committee publications

FaxAccess: (408) 741-1600 (fax-back)

Fax: (408) 867-2115

Global Engineering Documents

Phone: (800) 854-7179 (US)

(613) 237-4250 (Canada)

(303) 792-2181 (Outside North America)

Fax: (303) 397-2740

<ftp://ftp.symbios.com/pub/standards/io/>

ATA draft standards and other working documents are available at

<ftp://fission.dt.wdc.com/pub/standard/x3t13>

SCSI draft standards and other working documents are available at

<ftp://ftp.symbios.com/pub/standards/io/t10/>

Media Status Notification Support Specification, Version 1.03

Plug and Play specifications

SMART IOCTL API Specification, Version 1.1

<http://www.microsoft.com/hwdev/specs/>

*Multisession Compact Disc Specification**Enhanced Music CD Specification, Version 1.0*

Philips Consumer Electronics B.V.
Coordination Office Optical–Magnetic Media Systems
Building SWA-109, PO Box 80002
5600 JB Eindhoven, The Netherlands
Fax: (31) (40) 732113

Sony/Philips CD-ROM hardware logo program:
Bert Gall, Philips Consumer Electronics
Philips Consumer Electronics B.V.

Storage Device Class Power Management Reference Specification, Version 1.0

<http://www.microsoft.com/hwdev/onnnow.htm>

Universal Disk Format Specification, Version 1.502

<http://www.osta.org>

Universal Serial Bus Device Class Definition for Mass Storage Devices, Version 1.0

Phone: (503) 264-0590
Fax: (503) 693-7975
<http://www.usb.org>

WDM device driver support white papers

<http://www.microsoft.com/hwdev/desinit/>

*MultiRead Specifications for CD-ROM, CD-R, CD-R/RW and DVD-ROM Devices, Version 1.11 and 1.5**ECMA Standards ECMA-267 (DVD-ROM), ECMA-274 (DVD+RW) and ECMA-272, 273 (DVD-RAM)*

<http://www.ecma.ch>

Windows DDK, Windows NT DDK, and Microsoft Platform SDK

MSDN Professional membership

(The Windows DDK includes information about the Int 13h Extensions API.)

Checklist for Storage and Related Peripherals

If a recommended feature is implemented, it must meet the PC 98 requirements for that feature as defined in this document.

1. Storage device and controller support bus master capabilities
Required
2. Removable media includes media status notification support
Required
3. Device meets PC 99 general device requirements
Required
4. Device meets PC 99 requirements for ports or buses
Required
5. Device Bay storage device meets PC 99 requirements
Required
6. Secondary host controller uses IEEE 1394
Recommended
7. ATA devices and controllers support Ultra DMA/33
Required
8. USB-based mass storage device meets PC 99 requirements for USB
Required
9. System BIOS or option ROM supports El Torito No Emulation mode
Required
10. IDE floppy drive complies with SFF 8070
Recommended
11. Legacy FDC built into system
Optional
12. Legacy FDC device meets resource configuration requirements, if present
Required
13. System supports conflict resolution and dynamic disable capabilities for legacy FDC
Required
14. ATA hard drive is SMART-compliant and uses SMART IOCTL API
Recommended
15. CD device provides 8x minimum transfer rate or better performance anywhere on the disc
Required
16. CD drive is CD-Enhanced compatible
Required
17. CD drive supports specified logical and physical CD formats
Required
18. ATA/ATAPI CD drive complies with SFF 8020i, Version 2.6
Required
19. CD drive supports multisession and compatibility forms of the READ_TOC command
Required
20. ATA/ATAPI CD changer meets MMC-2 standard
Required

21. CD device uses push-to-close design
Recommended
22. Block rewritable ATAPI device meets MMC-2 standard
Required
23. DVD device provides 2x minimum transfer rate or better performance anywhere on the disc
Required
24. DVD drive and controller support bus master DMA transfers
Required
25. DVD drive meets minimum compatibility requirements
Required
26. DVD device meets MMC-2 standard
Required
27. DVD device uses push-to-close design
Recommended
28. DVD device supports defect management
Required
29. DVD device supports copyright protection
Required
30. Each device has a Plug and Play device ID
Required
31. Conflict resolution and dynamic disable capabilities supported for all devices
Required
32. 3F7h and 377h are unclaimed by devices
Required
33. Physical security is provided for storage devices
Recommended
34. Option ROMs support Int 13h Extensions
Required
35. Device and controller comply with device class power management reference specification
Required
36. Device supports wake-up events
Optional
37. Device drivers and installation meet PC 99 requirements
Required
38. Device driver runs in protected mode following installation
Required
39. Applications provided with the device meet Win32 requirements
Required
40. Device driver for partitioned media supports all Windows and Windows NT partition types
Required
41. Device driver for block-mode device supports extended BPBs
Required